

Chapter 7

Linear Programming



Copy & Complete these questions:

What job(s) would you like to have?

What job(s) could you get now?

Why is there a difference?

- experience
- time
- education
- criminal record
- age
-

Why would you want a job?

- money
- pension
- health care
- work experience
- interest.

- What would be some limitations to making the greatest amount of money?

- \$/hour
- experience
- years in job
- age.
- time
- location
- education
- position
- compensation

What are some different ways that you could be paid?

- * \$ / hour
- ton mile
- \$ / day
- * commission
- * salary

7.1 – Exploring an Optimization Problem

- Constraint – a restriction on the allowable values of a variable in a problem

Example: Only have 20 hrs. to work in a week, this is a constraint on the variable time.

- Investigation 1 & 2 together
- Check your understanding
- Page 308, #7-9

Investigation 1

Read over opening paragraph on page 306

What do we know?

- \$13.50 per couch bundle
- 2 hrs. per couch bundle
- \$5.50 per chair bundle
- 45 mins per chair bundle.
- she makes the fraction she finishes.

What constraints do we have?

- time available to work.
- type of material
- amount of material
- employer requires
- breaks
- taxes.

Classwork/Homework

1. Answer procedure questions Pg. 306 *A, B, C*

2. Answer investigation questions Pg. 307

→ Open your text and take out your work.

A.) $\frac{24 \text{ hrs.} - \text{week}}{\hookrightarrow 12 \text{ couches}} \times \$13.50 = \$324.00$

$\frac{10 \text{ hrs.} - \text{week}}{\hookrightarrow 5 \text{ couches}} \times \$13.50 = \$67.50$

$\frac{20 \text{ hrs.} - \text{week}}{\hookrightarrow 4 \text{ couches (8 hrs.)} \times \$13.50 = \$54.00}$
 $\hookrightarrow 16 \text{ chairs (12 hrs.)} \times \$5.50 = \$88.00$
 $\hookrightarrow \times 0.75$
 $\$142.00$

→ $\frac{10 \text{ hrs.}}{\hookrightarrow 13.3 \text{ chairs}} \times \$5.50 = \$73.33$

→ $\frac{2 \text{ hrs.}}{\hookrightarrow 1 \text{ couch}} \times \13.50
 $\hookrightarrow 2.7 \text{ chairs} \times \$5.50 = \$14.67$

B.) trial + error
- equation
- table of values
- graph.

C.)

$I = 5.50n + 13.50c$

Investigation #1 (Pg.306)

ANSWERS

A. Answers are limited by time (maximum money earned depends directly on time).

B. She can calculate an answer by solving an equation, trial and error, table of values, or a graph.

- find the answer by finding the sum of couch bundles made and the chair bundles made.

$I = 5.5b + 13.5n$ (b is the number of chairs and n is the number of couches)

C. Possible constraints:

- time in a day
- time in a week
- amount of material given
- number of chairs and number of couches that need to be made
- number of bundles required by the manufacturer
- the customer base
- the cost of chair and couch material
- the available material and cutting tools
- - the number of employees

Pg. 307 #1-3

#1. time 12 hrs \rightarrow week

3 combinations

- couches - \$81.00
 6×13.50

- chairs $(12 \div 0.75) = 16 \times 5.50 =$ \$88.00

- 3 couches (6 hrs.) $\times 13.50$ \$40.50

8 chairs (6 hrs) $\times 5.50 =$ \$44.00

\$124.50

#3.

#4) 5 hrs.

$$\rightarrow 2 \text{ couches} + 1.3 \text{ chair} = \$ 34.15$$

$$\begin{array}{r} 4 \text{ hr.} \\ 2 \times 13.50 \\ 27.00 \end{array} \quad \begin{array}{r} 1.3 \times 5.5 \\ 7.15 \end{array}$$

$$\rightarrow 3 \text{ chairs} + 1.4 \text{ couches} = \$ 35.40$$

$$\begin{array}{r} 3 \times 5.50 \\ 16.50 \end{array} \quad \begin{array}{r} 1.4 \times 13.50 \\ 18.9 \end{array}$$

$$\text{chair} \\ \$ 36.85$$

#5) week \rightarrow 5 days

$$36.85 \times 5 = \$ 184.25$$

#6) a) less money.

b) more money.

c) i) - sports - 1 hr.

sleep - 7 hr.

school - 7 hr. —

eat/free time - 2 hr.

+ 7 hrs. \rightarrow

$$\text{ii) } \$ 49.50$$

iii) Travel \rightarrow

Transportation

>

<

*

\geq

\leq

#7. a) - 2000 ha \checkmark

- no more than 1500 ha lettuce \checkmark

$$x \leq 1500 \text{ ha}$$

- no more than 1000 ha corn \checkmark

$$x \leq 1000 \text{ ha}$$

b) * 1000 corn + 1000 lettuce \rightarrow Yes

- 1500 lettuce + 500 corn \rightarrow Yes

c) - 1500 + 1500 - No

d) -

#4) 5 hrs

$$\rightarrow \begin{array}{l} 2 \text{ couches} + 1 \text{ chair} \\ 4 \text{ hrs.} \quad 0.75 \text{ hrs.} \\ 27.00 \quad 5.50 \end{array} = \$32.50$$

$$\rightarrow \begin{array}{l} 4 \text{ chairs} + 1 \text{ couch} \\ 3 \text{ hrs.} \quad 2 \text{ hrs.} \\ 22.00 \quad 13.50 \end{array} = \$35.50$$

$$\rightarrow \begin{array}{l} 2.5 \text{ couches} \\ 5 \text{ hrs.} \end{array} = \$33.75$$

$$+ \rightarrow \begin{array}{l} 6.6 \text{ chairs} \\ 5 \text{ hrs.} \end{array} = \textcircled{\$36.30}$$

#5) $36.30 \times 5 = \$181.50$

#6) a) 4 hrs. → makes less

b) 6 hrs. → more money

c) i) homework - 1 hr.

sleeping - 8 hr.

eat - 0.5 hr.

free time - 3 hr.

School - 9.5 hr.

sports - 2 hr. +

24 hrs.

\$0

i) \$0

iii) sports

Pg. 308

#7

a) - 2000 ha

- plant no more than 1500 ha of lettuce
- plant no more than 1000 ha of corn.
- satisfy customer demand.

b) 1000 lettuce + 1000 corn

1500 " + 500 corn

1750 " + 750 "

c) 1 " 1999 " NO

d) same amount 2500 ha.

7.2 – Exploring Possible Solutions

- Feasible solution – any solution to a problem that is possible within the constraints given



Focus B

- Let's look at this together!
- Complete Investigation 3
- Check your Understanding
- Page 314 #12-18

Focus B (Pg. 310)

Organize the information (constraints) given on Pg. 310 and the ones given on Pg. 306 into the following table:

CONSTRAINT	TIME	SPECIFICS
Bundles	2 weeks	At least _____ Couch Bundles
		At least _____ Chair Bundles
Time	1 week	Work a Maximum of _____ hours
	n/a	_____ Hours per Chair
	n/a	_____ Hours per Couch
Material	2 weeks	Maximum of _____ m
	n/a	_____ m for a Chair
	n/a	_____ m for a Couch

Focus B (Pg. 310)

Organize the information (constraints) given on Pg. 310 and the ones given on Pg. 306 into the following table:

CONSTRAINT	TIME	SPECIFICS
Bundles	<u>2 weeks</u>	At least <u>10</u> Couch Bundles
		At least <u>8</u> Chair Bundles
Time	1 week	Work a Maximum of <u>18</u> hours
	n/a	<u>0.75</u> Hours per Chair
	n/a	<u>2</u> Hours per Couch
Material	2 weeks	Maximum of <u>110</u> m
	n/a	<u>3</u> m for a Chair
	n/a	<u>5</u> m for a Couch

Focus B - Question 2 Copy & Complete

Copy & Complete

-Create 5 solutions that are possible and 5 that are not possible

[illegible]